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ABSTRACT

A three-day conference on intelligent videodisc systems was held to formulate a plan for the development of the necessary videodisc hardware and the possible production of materials to be available on a commercial basis. Those attending the conference included individuals from academic institutions and similar organizations concerned with using the computer as an educational tool, developers and potential manufacturers of the videodisc technology, developers and producers of computer equipment, and representatives from government agencies. Activities included presentations of informal review papers, small group discussions and reports, and demonstrations; topics covered were trends in private computing, computer assisted instruction, videodiscs and home entertainment, hardware and software, courseware production, development sites, marketing possibilities, and organizational mechanisms. (CMV)

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CONFERENCE ON INTELLIGENT VIDEO DISC SYSTEMS

Brief Informal Summary

National Science Foundation

Pajaro Dunes, California

December 1-3, 1977

Codirectors: Alfred Bork

University of California
Irvine

Arthur Luehrmann

University of California
Lawrence Hall of Science

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The conference on intelligent videodisc systems was held at Pajaro Dunes on November 30 to December 3, 1977. The following summary, prepared shortly after the meeting, is intended only as an informal guide to the activities of the meeting. More detailed information will be available on request.

Purpose of Conference

The organizers proposed the conference because they feel that an important moment in education is occurring, the moment when the computer plus powerful associated audiovisual capabilities can have a major effect on education at all levels. The paper in Appendix A gives the background. The computer has already proved to be a powerful aid to learning, and its steady decrease in price makes it more and more attractive economically. The optical videodisc provides a versatile low-cost storage medium for both audiovisual material and for computer code and data. Further, it is not erasable, hard to copy, and requires no special handling. The combination of these two technologies has exceptional promise for education.

The principal purpose of the conference was to formulate a plan for development not only of the necessary hardware but also the possible production of materials to be available on a commercial basis. The system would involve a combination of the latest computer technology and the latest videodisc technology.

The people invited to the conference were carefully chosen. At least four types of individuals were represented. First, there were people from academic institutions, and similar organizations, who are particularly concerned with using the computer as an educational tool. Second, there were the developers and potential manufacturers of the videodisc technology. Third, there were the

developers and producers of computer equipment. Finally, representatives from a number of governmental agencies were present. Forty-four people attended.

A series of demonstrations was available for participants to view at times during the conference. These demonstrations will be described in more detail later in this report.

First Day

The conference began with three informal review papers. As many of the people in the audience were experts in the three areas involved, they were invited, and sometimes called upon explicitly, to add to these introductions.

The first discussion was by Arthur Luehrmann, "Trends in Private Computing." He surveyed current personal computers and projected cost estimates in a variety of ways of stand-alone computer systems. A summary of these remarks is contained in Appendix B. The second talk, "State of Educational Computing and Its Requirements," was given by Alfred Bork. He reviewed the ways the computer could be used in education, a few projects, hardware requirements (including the need for graphics), and the problems of production in publishing such materials. The paper in Appendix C although prepared for other purposes, follows the discussion closely. The third talk, "Videodiscs as Home Entertainment Media and Other Prospects," was given by Edward Schneider. It reviewed the videodisc technology as it has been developed by a number of different vendors, and also reviewed the cost of putting visual and film material on such a medium as compared to the cost of putting the same material on other media. A previous paper, covering some of the same ground, is in Appendix D.

In the afternoon session on the first day the participants discussed three further items, all considered in more detail at later stages of the meeting. The first topic was that of the time scale. How soon is it likely that computer-based learning material, including computer-based learning material involving the videodisc technology also, will become widespread in American universities? Some feeling was expressed that a Carnegie Commission report, The Fourth Technology - Instructional Revolution in Higher Education, offered a time scale which was reasonable, although a bit conservative. Here it was predicted that between 1990 and 2000 such material will be introduced very rapidly, and that after 2000 it will be generally available. The Carnegie report refers to higher education, but no argument was offered that a different time scale would apply in any other area.

The hardware situation was indicated by some of the demonstrations available at the conference. Two videodiscs were available, the Teldek disc and the Thomson-CSF Optical Video Player. Only optical players seemd to fit in with the educational requirements. There has been a long series of delays in the introduction of the home optical videodisc system, with test marketing of the Philips system now announced for this spring. But a commercial-industrial educational system is available now from Thomson-CSF and MCA. These two systems have been widely shown, particularly in the military environment, and they are currently operational. Limited production of the Thomson-CSF system will begin soon in France. Initial units are, in the small scale production, estimated as costing approximately \$4,000.

A variety of state-of-the-art computer systems were also available. A full-scale, high resolution, graphic display from

Tektronix, was used to run some demonstrations of computer-based learning material. A stand-alone system, with only slightly less resolution, with floppy disc and powerful calculating capabilities, costing about \$5,500, was exhibited also; this system is sold by Terak. Finally, two of the initial entries into the home computer market (as opposed to the hobbyist computer market) were available, the Commodore PET machine and the Radio Shack computer; both of these systems sell for approximately \$600. While the Commodore and PET were considered by most of the participants at the conference as inadequate for current educational uses, they indicate the rapid decrease in the cost of such hardware. Other vendors are expected to enter this market, with increased capability.

An important issue in the afternoon and evening sessions was that of courseware production. It is realized that the hardware alone is not sufficient, but that hardware sales will be driven by the availability of well tested, effective course materials. A vigorous discussion ensued as to the ingredients of a production method, with participants describing successful systems for producing computer-based learning materials and systems for producing videodisc materials. The question of markets also received attention in these sessions.

Second Day

The second day was devoted to setting the stage for several smaller working groups, followed by the meetings of the groups. These groups were asked to consider the evolutionary paths that might lead from our present situation to the widespread use of intelligent videodisc systems, considering all the problems involved. They were invited to develop scenarios as to the stages along such development. A four to five year time scale was suggested.

As of this writing, the coordirectors have not had an opportunity to fully integrate the reports of the groups. The following outline shows the range of the activities considered.

The groups discussed seven stages in the evolution toward commercial production of learning material involving computers and videodiscs.

1. Prototype courseware development projects

Purposes:

To gain experience in development of interactive learning materials.

To investigate what improvements are needed in the available hardware.

To see what current experiences are relevant to this new media.

To gain experience in using this approach with a variety of students, and to compare its effectiveness with other approaches.

Possible areas for development:

Segments of beginning college science and math courses.

Seek areas that are difficult to teach.

Develop several different kinds of course materials.

Begin with material (films, books, CAI) which is selling well.

Ecology-related areas.

Possible development sites:

Universities

Not-for-profit organizations

Corporations (though not likely)

Materials to be tested in colleges and universities

Possible starting points for projects:

Existing successful CAI material - TICCIT, PLATO, PCDP.

Existing successful film (tape) material.

Existing successful text material.

New developments to exploit the capabilities of the medium.

Time scale:

Typically 2-year projects.

~~Options to continue.~~

Likely funding sources:

Federal.

Possible industry support.

Hardware:

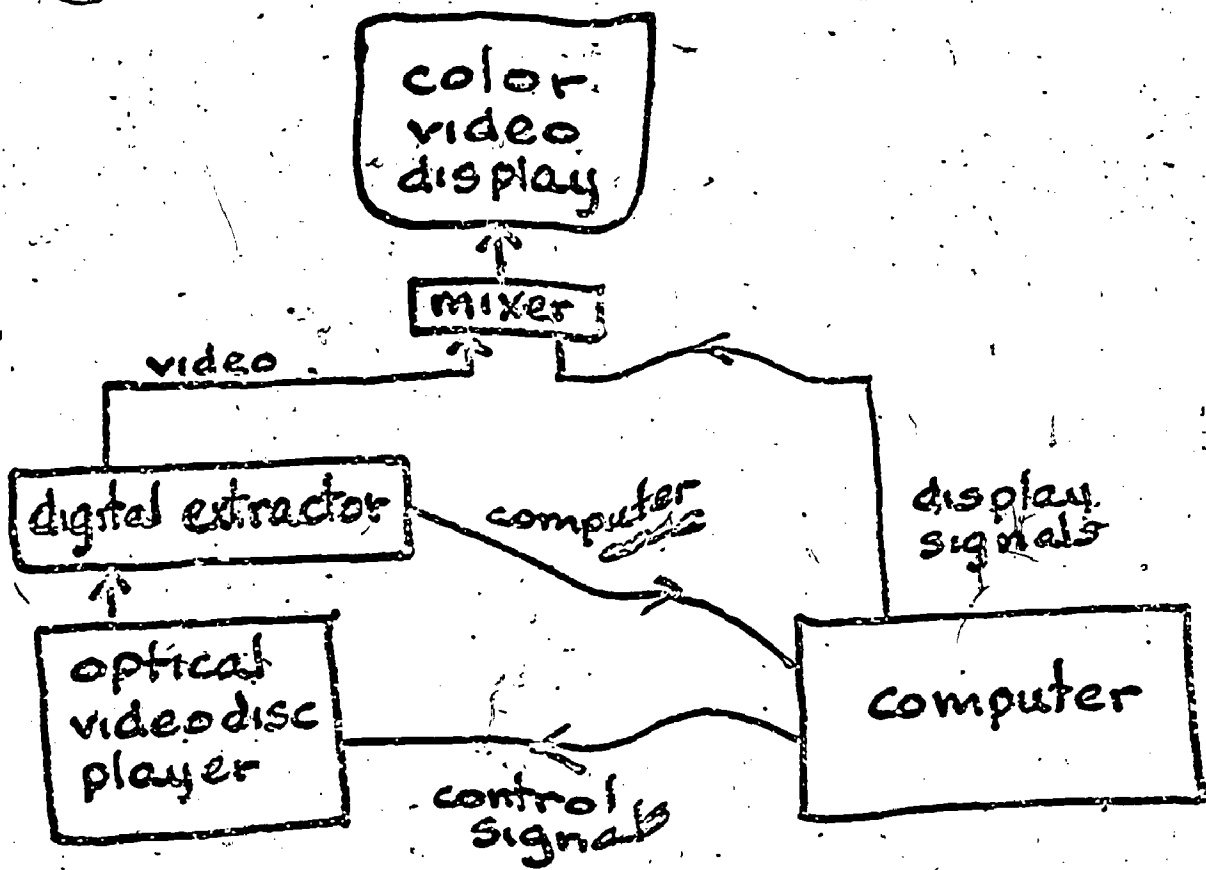
Use existing videodiscs.

Interface with available (stand-alone computer system.

Display - home color TV set.

Switch to send code from the videodisc to the computer, pictures to the display. This "extractor" may need additional development.

Possible system shown on the next page.



2. Development of hardware for delivery system.

Delivery system is the hardware used by students.

Areas probably requiring development:

Faster access to (digital) information on disc.

Improved resolution of TV display.

Better display of text, approaching print quality.

Better graphic resolution.

Control of TV flicker.

System integration to reduce cost.

Other possible cost reductions.

Improvements suggested while developing prototype courseware.

Inexpensive hardcopy from video.

Reduction of the cost of color.

Protection features to prevent illegal copying of material.

How is hardware to be made available to end user?

Government subsidy may be desirable.

Hardware development should be funded primarily by the vendors.

Some government support possible.

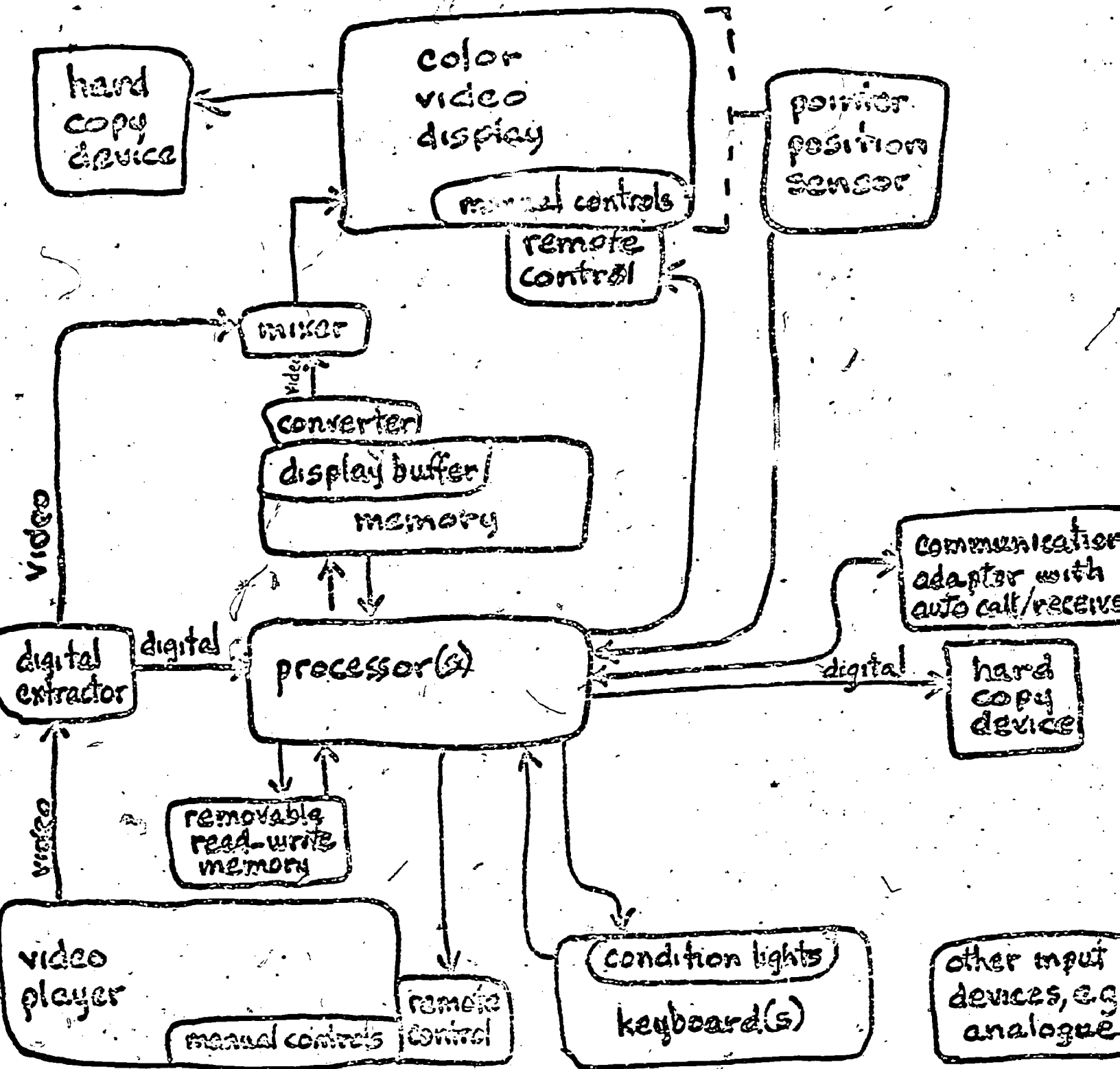
Standardization may be a problem, particularly with the manner in which code is placed on the videodisc.

Various types of delivery systems may be practical.

Simple system, minimal cost.

Standard system.

Complex system allowing artificial intelligence possibilities.



3. Hardware development for authoring system:

Probably not the same as delivery system:

Greater memory requirements.

Ease of revision of the materials as they are being developed.

Data collection facilities as the material is pretested with students.

May be able to use hardware from systems developed for assembling military training videodiscs.

4. Study of market possibilities:

Rely partially on input from prototype projects.

Educators should play a major role in determining the market.

May need to include markets other than conventional classroom.

Learning centers or skills centers.

Military-industrial training.

Handicapped and disadvantaged students.

High-cost areas such as wet laboratories.

Perhaps seek populations not currently well served.

If price of system is sufficiently low, the home market will be very important.

Stand-alone system allows lower entry cost, compared to multiterminal systems.

Library possibilities.

High schools may be important market, if hardware is not too expensive.

Teaching basic skills, such as reading, writing, and mathematics.

5. Development of production systems:

Incentives to initiate development projects:

Subsidies.

Market studies.

New or expanding markets for existing equipment.

Models for production system:

"Open University" course development.

Previous large-scale curriculum projects (using other media).

Authoring systems for previous computer-based learning projects.

Steps in developing production system:

Initial design

Development of necessary software.

Development of necessary hardware.

Procedures for training personnel involved.

Development of evaluation and review system.

Possible funding sources for development of system:

Potential courseware developers (listed above).

Adult education funds.

Desirable to have several competitors in the field.

6. Courseware production:

Who might produce the courseware.

Computer vendors.

Videodisc vendors (unlikely).

Book publishers.

New companies formed for this purpose (profit and not-for-profit).

Consortia.

Integrators.

Existing non-profits (e.g., CONDUIT, EDUCOM)

Film companies

7. New organizational mechanisms:

New organizational structures may be required to meet new technology. This approach fits in well with self-paced and mastery-based courses. Institutions similar to Open University have audience.

Informal educational institutions:

Public library.

Community center.

Science centers (90 in country, 40M visitors).

Shopping centers, airline terminals.

Could establish testing systems independent of instructional systems offering more "how-to" courses.

Continuing education for doctors, etc.

Methods to form Open University organization:

Unlikely to be done privately.

Piggy-back on existing organizations, for example:

Empire State (NY).

Coastline (Orange Coast, CA).

Goddard.

Antioch.

Develop support in state legislatures and Congress.

Strive, through political action, toward new organizational mechanisms, but don't depend on them.

Third Day

The short third day began with a discussion of the reports of the working groups, and finally ended with a summary prepared by Joseph Lipson.